

A Review on Anti-Biotics (Anti- Bacterials)

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Antibiotics are the 'wonder drugs' to combat microbes. For decades, multiple varieties of antibiotics have not only been used for therapeutic purposes but practiced prophylactically across other industries such as agriculture and animal husbandry. Uncertainty has arisen, as microbes have become resistant to common antibiotics while the host remains unaware that antibiotic resistance has emerged. The aim of this review is to explore the origin, development, and the current state of antibiotic resistance, regulation, and challenges by examining available literature. We found that antibiotic resistance is increasing at an alarming rate. A growing list of infections i.e., pneumonia, tuberculosis, and gonorrhoea are becoming harder and at times impossible to treat while antibiotics are becoming less effective. Antibiotic-resistant infections correlate with the level of antibiotic consumption. Non-judicial use of antibiotics is mostly responsible for making the microbes resistant. The antibiotic treatment repertoire for existing or emerging hard-to-treat multidrug-resistant bacterial infections is limited, resulting in high morbidity and mortality report. This review article reiterates the optimal use of antimicrobial medicines in human and animal health to reduce antibiotic resistance. Evidence from the literature suggests that the knowledge regarding antibiotic resistance in the population is still scarce. Therefore, the need of educating patients and the public is essential to fight against the antimicrobial resistance battle.

Antibiotics, either are cytotoxic or cytostatic to the micro-organisms, allowing the body's natural defenses, such as the immune system, to eliminate them. They often act by inhibiting the synthesis of a bacterial cell, synthesis of proteins, deoxyribonucleic acid (DNA), ribonucleic acid (RNA), by a membrane disorganizing agent, or other specific actions. Antibiotics may also enter the cell wall of the bacteria by binding to them, using the energy-dependent transport mechanisms in ribosomal sites, which subsequently leads to the inhibition of the protein synthesis.

Origin of antibiotic resistance

Antibiotic resistance was reported to occur when a drug loses its ability to inhibit bacterial growth effectively. Antibiotics are usually effective against them, but when the microbes become less sensitive or resistant, it requires a higher than the normal concentration of the same drug to have an effect.

The emergence of antimicrobial resistance was observed shortly after the introduction of new antimicrobial compounds. Antibiotics used in agriculture are often the same or similar to antibiotic compounds used clinically, this over-usage could also invite drug resistance. The food chain can be considered the main route of transmission of antibiotic-resistant bacteria between animal and human populations. In some developed countries, animals receive antibiotics in their food, water, or parenterally which may be responsible for carrying microbe resistance to that specific antibiotic. For example, the use of antibiotics in cattle feed as growth promoters increase antibiotic resistance. Recent evidence suggests that poultry or pork might be a possible source of quinolone resistant-Escherichia coli in the rural villages in Barcelona, where one-fourth of children were found to be fecal carriers of these organisms. However, these kids were never exposed to quinolones.

Development of antibiotic resistance

Antibiotics fight to eliminate bacteria. Hence, bacteria tend to have a natural process that encourages resistance. The resistance process occurs via gene level mutations. Antibiotics induce selective pressure and the genes act in association with selective pressure. Bacteria possess the quality to directly transfer genetic material between each other by transferring plasmids, which signifies that natural selection is not the only mechanism by which resistance evolves. Broad spectrum antibiotics are prescribed in hospitals as a solution for nosocomial infections; however, it increases resistance.

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